Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
2000 Biennial Regulatory Review--	)	IB Docket No. 00-248
Streamlining and Other Revisions of	)	
Part 25 of the Commission's Rules	)	
Governing the Licensing of, and	)	
Spectrum Usage by, Satellite Network	)	
Earth Stations and Space Stations	)	
	)	
Amendment of Part 25 of the Commission's	)	IB Docket No. 86-496
Rules and Regulations to Reduce Alien)		
Carrier Interference Between Fixed-	)	
Satellites at Reduced Orbital Spacings and	)	
to Revise Application Procedures for	)	
Satellite Communication Services	)	

COMMENTS OF AVL TECHNOLOGIES, INC.
ON
THE COMMISSION'S SIXTH REPORT AND ORDER AND THIRD NOTICE OF PROPOSED RULEMAKING RELEASED MARCH 15, 2005

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AND THIRD NOTICE OF PROPOSED RULEMAKING
RELEASED MARCH 15, 2005

AvL Technologies, Inc. ("AvL") hereby submits its Comments on the Commission's Sixth Report and Order and Third Notice of Proposed Rulemaking [FCC 05-62], Released March 15, 2005.

A. AvL recommends the FCC consider the demonstration of pointing accuracy as a means of granting routine licensing of antennas that do not meet the requirements of the proposed 25.209 (a), (b) and (g) beginning a 1.5° but will meet 25.209 (f).

1. In FCC 05-63, *Fifth Report and Order in IB Docket No. 00-248 and Third Report and Order in CC Docket No. 86-496* the Commission states "Our primary goal in this proceeding is to streamline our review of earth station applications that, while they fail to meet the technical standards for routine processing currently in Part 25, can because of advances in technology, be operated without causing harmful interference to adjacent satellites or

terrestrial wireless operations in shared bands." In its research for this Report and Order the Commission has recognized that controlling EIRP density is the correct controlling specification and that advances in technology of modulation techniques, such as spread spectrum and CDMA, can reduce the power density transmitted and consequently allow transmission from very small aperture (non-compliant) antennas without exceeding the allowable EIRP density. The Commission should also recognize other advances in technology during its consideration such as computer controlled positioning of temporary-fixed antennas. The FCC should embrace this existing technology that was originally developed for large aperture satellite antennas so that the smallest aperture antennas can be used to further increase the use of satellite broadband communications.

2. In the 1970's commercial microprocessors for equipment control were introduced. The first was the Intel 8088 microprocessor. At approximately the same time, optical encoders for regular motors and stepper motors became less costly and readily available. This allowed creating computer controlled equipment capable of performing at very high accuracies (0.001 inches and 0.01 degrees) which could be operated by normal people instead of highly trained and skilled craftsmen. The first major implementation was in CNC metal machining equipment. CNC equipment allowed producing precision components using unskilled machine loaders instead of craftsmen. All they need to know was how to load the raw material and push the start button. This same technology of programming a precise positioning operation was extended into all types of equipment including critical / medical operating equipment for never before attempted eye surgery and in un-critical applications as sewing embroidery company logo's on shirts and hats. The reduction in cost and expansion of capability of this technology can be easily realized with by the $198 printer that can produce photo quality pictures. This technology is being used in almost all equipment from automobiles, airplanes, spacecrafts, copiers, printers, money processing, etc. It is a technology that the FCC should consider in setting regulations for fixed and fixed temporary earth station antennas in addition to ESV satellite antennas.

3. Automatic and accurate positioning of fixed VSAT antennas is also easily doable but for some reason not used at this time. The problems of human error in manually positioning small aperture, wide beam satellite antennas should not drag down and prevent the use of smaller aperture antennas using automatic and accurate computer driven methods. The FCC should separate human pointing of fixed VSAT antennas and computer pointing of temporary-fixed antennas and address them as totally separate categories. This need to separate the two methods has occurred largely because of the reduction in antenna aperture sizes. Large aperture antenna manufacturers

quickly embraced automatic positioning because of the narrow beamwidths. While humans could achieve satisfactory results with careful application of their trained skills, satellite movement, wind disturbances and the need for automatic tracking of parabolic antennas caused computer controlled positioning to be quickly embraced by earth station antenna manufacturers and users. The addition of Ku-band satellites during the late 70's forced the use of this technology. Specifications of positioning accuracy within 0.1° were common place. Because the large aperture antenna had such a narrow beam, the FCC did not have to address antenna pointing accuracy in its rules and regulations because failing to correctly point a large aperture antenna resulted in problems only for the user and not for the adjacent satellite operators. This same technology and knowledge can be applied to smaller aperture antennas in order to prevent adjacent satellite interference. Only when Satellite News Gathering became common place did adjacent satellite interference become an issue. This was due to human error and could have been completely eliminated by the use of computer technology for this application. While manual pointing can be within 0.5° per SIA or 0.4° per Spacenet, computer pointing can easily achieve 0.2° or better.

4. In conclusion, AvL Technologies asks the FCC to embrace using existing automatic and accurate positioning methods used by the larger aperture satellites, ESV satellite antennas and essentially all other commerce to expand the use of satellite communications. Not wishing to address pointing technology and specifications is not in the best interest of expanding the use of satellite communication. AvL Technologies recommends interpreting 25.209 (f) to mean that a demonstration that 25.209 (f) can be achieved with computer pointing of the satellite antenna such that the main beam of the antenna above $29 - 25 \log \Theta$ does not point at the adjacent satellite. This is equivalent to that of the Third Order for ESV's. Also, power reduction or affidavits from adjacent satellites should only be required if 25.209 (f) is not met.

B. AvL offers the following comments concerning the Fifth and Sixth Report and Orders.

1. AvL agrees with the Commission and SIA on allowing routine processing of Ku-band earth stations that intersect the antenna gain pattern envelope at 1.5° off-axis or less. However, AvL believes that it should not be necessary to require coordination with the target satellite operator or any adjacent satellite operators if the Ku-band antenna gain pattern intersection falls between 1.5° and 1.8° if it can be demonstrated that considering pointing accuracy there little possibility of causing harmful interference to adjacent satellites.

2. AvL recommends that the FCC include antenna pointing accuracy and wind loading performance for motorized antennas and allow small antennas with main lobes that exceed the recommended 1.5°

3. The FCC did not clarify its position on non-circular reflectors. AvL believes that for all non-circular reflectors the applicable antenna dimension and associated sidelobe pattern used to demonstrate compliance with 25.209 must be kept aligned with the GSO plane for all non-circular reflectors. This requirement should be added to the FCC rules.

4. AvL agrees with adopting an off-axis angle starting at 3° for conventional Ku-band gain envelope outside the GSO plane.

5. AvL Technologies endorses increasing the beginning of the 25.209 a) to 1.5° but allowing antennas to be routinely licensed if demonstration of pointing ability meets requirements of 25.209 f) in addition to routine licensing if power is reduced to meets FCC requirements. Requiring affidavits from adjacent satellite operators up to 6° away is far too cumbersome and will slow down and maybe stymie the use of the smallest feasible aperture that meets 25.209 f). Pointing ability is clearly defined in Electronics Institute of America's RS-411 "Electrical and Mechanical Characteristics of Antennas for Satellite Communications "Chapter Three. This definition of rms pointing error could be applied to demonstrate compliance to 25.209 f).

6. Attempting to control adjacent satellite interference only by aperture size only is already not working. The FCC is licensing temporary-fixed 1.2 meter antennas using standard gear drives produced by novice satellite antenna manufacturers that have up to 1° of backlash. Therefore any wind disturbance can cause the antenna to easily be mispointed such that 25.209 f) is grossly violated. However this 1° of movement will not necessary cause a loss of sufficient signal to cause loss of modem lock or visible degradation of video signal to alert the user. The FCC would have to increase the aperture size at Ku band to a 1.5M to guarantee no accidental adjacent satellite interference without the user knowing the antenna has been miss-pointed. Backlash should be controlled to less than 0.1° in azimuth and less than 0.2° in elevation for all size antenna apertures.

7. AvL recommends that applications for temporary-fixed antennas should include pointing accuracy demonstration along with antenna patterns for all antennas now considered non-compliant because of antenna beamwidth.

8. The Satellite Industry Association in its recent Petition for Reconsideration dated July 8, 2005 noted that "Smaller earth stations are, in turn, typically prone to larger pointing errors than those of larger antennas. AvL

completely agrees. This is due in large part to the manual pointing of fixed VSAT antennas. Most methods in use today only provide the installer with a receive signal level indicator. With the much broader main beam widths encountered with the smaller antennas it is probable that the antenna can be incorrectly manually aligned on the center of the main beam. The network operator is usually not aware of the mispointing because of perceived acceptable link performance. While not causing performance degradation to the return link, however, harmful interference from the main lobe is directed to an adjacent satellite. ViaSat and others have recognized this and have developed techniques and procedures that, although more costly, can accurately peak the antenna to the center of the main beam.

9. AvL agrees further with SIA's concerns stated in their Petition for Reconsideration dated July 8, 2005. Simply relaxing the start of the gain pattern envelope to 1.5° off-axis and address antenna pointing error issues by simply requiring "VSAT network operators to design their networks to stop transmissions when synchronization fails.", AvL believes will not have the desired affect of minimizing harmful interference. With the wider beamwidths the antenna mispointing can be well beyond the 0.5° (recommend in FCC 04-286 on ESVs) before the return side of the link degrades to a point where it looses synchronization. In a large network with various antenna sizes and vast coverage areas and associated footprint variations the link margins may be significant and degradation of greater than 10 dB may be required before synchronization is lost. Other methods must be used to sense movement of the antenna instead of modem lock. Computer controlled positioning antennas inherently have methods of sensing antenna movement and ceasing transmission.

10. AvL asks the FCC to recognize that fixed temporary antennas with computer pointing pose less threat to adjacent satellite fixed manually pointed antennas. They eliminate human errors and usually transmit for finite periods of time.

11. AvL asks the FCC to consider that the original technical investigation and proposal for 2° satellite spacing in 1983 included sidelobe excursions of up to 3 dB above the 29-25 log Θ curve. This potential, occasional, random increase in energy directed at adjacent satellites was evaluated to be acceptable. This 3 dB excursion was deleted from the final Rule and Order without technical consideration. AvL proposes that an additional, occasional increase in energy directed at adjacent satellites and should be allowed by the FCC to maximize the use of the satellite communications frequency bands. Note is 25.133 (b) the FCC already allows 2 dB

excursions over 25.209 after completion of construction of satellite earth station antennas.

AvL Technologies would like to have the opportunity to further demonstrate that computer pointing is a proven, reliable technology that should be considered by the FCC in routine licensing of temporary fixed earth station antennas.

Accordingly, AvL respectfully the Commission to take these Comments into consideration.

Respectfully submitted,

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